

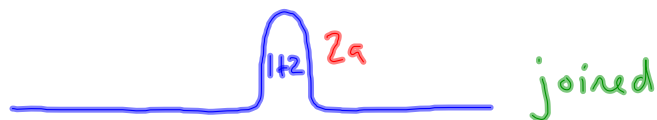
## More Waves:

- Refraction:

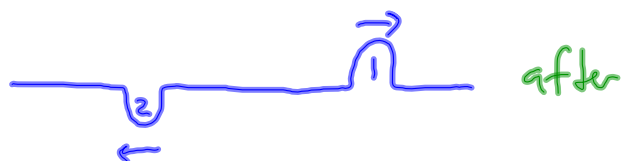
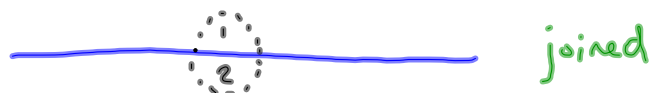
- Bending of waves when they go from one medium to another
- Each time wave changes medium, wave is deflected
- Wavelength stays the same, but velocity and frequency change
- Index of Refraction  $\rightarrow$  measure of how much a wave will deflect
- We use a prism and white light to show separation of colors

• Wave Interactions:

- When two waves interact with each other, interference happens
- Two types:
  1. Constructive  $\rightarrow$  waves join together to create a larger wave
  2. Destructive  $\rightarrow$  waves cancel each other out
- Constructive Interference Picture:



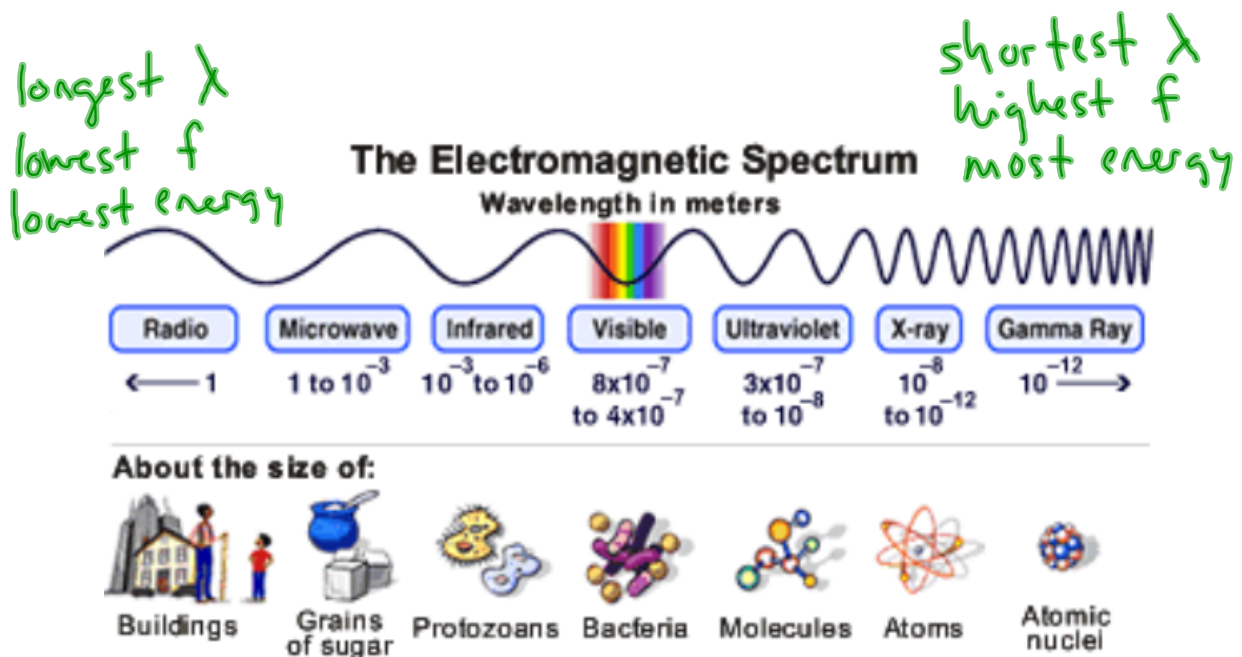
- Destructive Interference Pictures:



- Lenses:

- Optical device that is (usually) symmetrical and transmits and refracts light
- Two types:
  1. Converging
  2. Diverging
- We either use a ...
  - Simple lens → reading glasses, magnifying glass, your retina
  - Compound lens → telescope, microscope, camera

- Electromagnetic Spectrum (EMs):
  - This type of wave does NOT need a medium to travel!
  - In free space, wave travels at  $3 \times 10^8$  m/s.



- Radio Waves:
  - Longest wavelengths but lowest frequencies
  - Wavelengths vary from 100 km to 0.1 m
  - Used by radios, TVs, RADAR systems, and some cell phones
- Microwaves :
  - Used by long-range communications, microwaves, cell phones, pagers, bluetooth, wireless networks
- Infrared (IR):
  - Light from the sun that warms you up
  - Uses → Remote controls, night vision, short-range wireless, thermal scanners